Chapter 7

VISUAL-INFRARED OBSCURANTS

Today virtually every nation and non-state organization has access to—

- advanced tactical sensors for target acquisition (thermal imagers) and intelligence gathering surveillance systems (ground and air reconnaissance).
- precision-guided munitions delivered by artillery, missiles, and aircraft that operate in the IR region of the electromagnetic spectrum.

These capabilities are available through internal manufacturing or purchase on the world market.

These thermal imaging sights allow them to acquire and engage targets through visual smoke, at night, and under adverse weather conditions. To counter the increasingly sophisticated sensor threat, the M56 and M58 smoke generator systems provide maneuver commanders the capability to control and dominate the visual through far infrared (IR) portions of the electromagnetic spectrum using visual (fog oil) and infrared (graphite) obscurants.

VISUAL-INFRARED OBSCURANT GENERATOR SYSTEMS

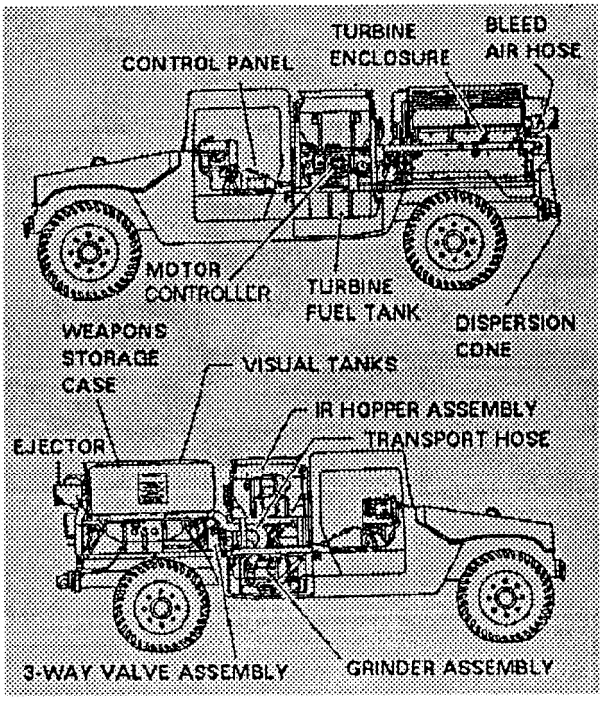


Figure 7-1. M56 Smoke Generator System.

The M56 Smoke Generator System (Figure 7-1) mounted on an Ml113 HMMWV is organic to motorized smoke units and dual-purpose smoke/decontamination units. The M56 can produce 90 minutes of visual/near infrared obscurant and 30 minutes of infrared obscurant without resupply. This system can produce obscurants while mobile or stationary.

The M58 Smoke Generator System (Figure 7-2) mounted on the M113A3 APC is organic to mechanized smoke units. The M58 can operate mobile or stationary. It can produce 90 minutes of visual/near infrared obscurant and 30 minutes of infrared obscurant without resupply. Chassis improvements allow the M58 to keep pace with mechanized and armor units. The systems are equipped with a driver's thermal imager and an NBC contamination particulate filter unit.

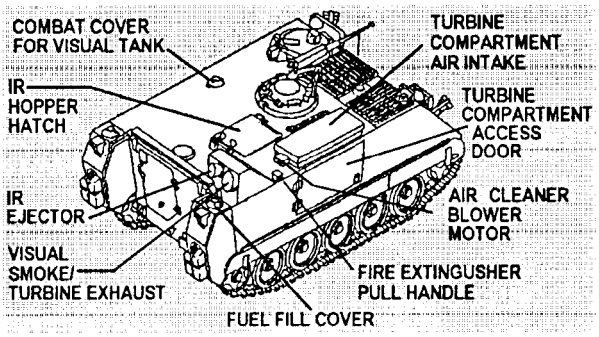


Figure 7-2. M58 Smoke Generator System.

Each system can selectively produce visual obscurants (vaporized fog oil) to defeat acquisition in the visual, and near infrared and infrared obscuration (graphite flakes) to defeat target acquisition devices that operate in the mid and far infrared. The two obscurants may be employed simultaneously or separately. If employed simultaneous y, the threat force's capability to acquire targets with day sights and thermal imagers will be degraded. If employed separately, the visual obscurant will degrade day sights and the IR obscurant will degrade the thermal imagers.

OBSCURANT EFFECTS ON SENSORS/SEEKERS

Visual and infrared obscurants have distinctly different effects on friendly and threat force sensors.

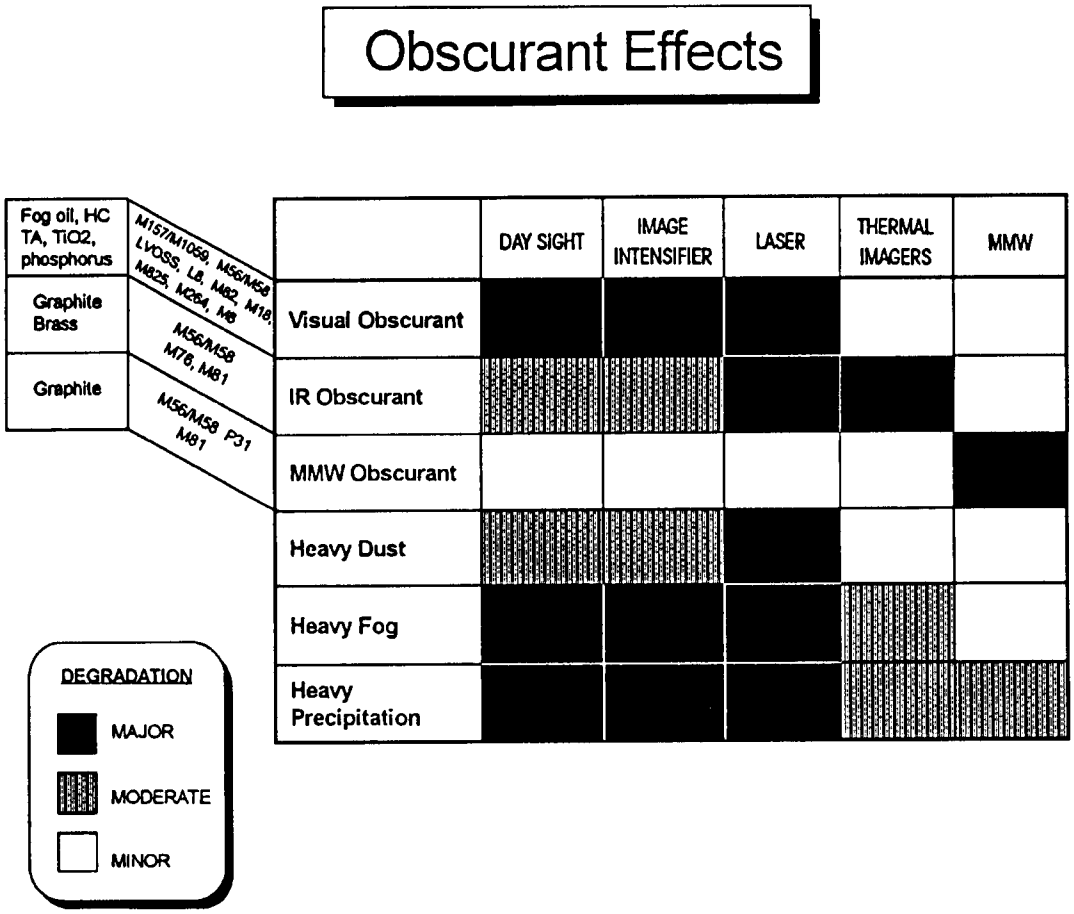
Therefore, commanders and staffs must understand the opportunities and limitations associated with each. Employment of infrared obscurants is a double-edged sword. A maneuver commander may want the added concealment offered by an infrared obscurant (graphite), but must accept the fact it will also degrade his own systems. Commanders and staffs must identify the threat sensor/seeker systems to be countered, determine the obscurant to be employed, and identify impacts on their own systems. Table 7-1 depicts the types of sensors and seekers found on today's battlefields and the relative degree of degradation caused by various natural end man-made obscurants.

VISUAL-INFRARED OBSCURANT CONCEPTS

Intelligence preparation of the battlefield (IPB) determines how the threat arrays sensors and seekers on the battlefield. After the IPB process has been accomplished, the chemical battle staff develops a plan to integrate smoke and obscurant assets into the operational plan. The goal of the obscurant plan is to defeat critical threat sensors and seekers. For example, the IPB process has determined that the threat possesses a significant thermal imagery capability located with his reconnaissance assets. The smoke plan would likely focus on employing IR obscurants whenever and wherever the threat might attempt to utilize his reconnaissance assets.

The doctrine for IR obscurants is different from the doctrine for visual obscurants. IR obscurants provide the capability to defeat a significant threat asset—thermal imagers. Visual obscurants are used primarily to provide force protection from a threat having limited electro-optical capabilities such as first generation FLIR or with an even lesser capability such as systems that can only operate in the visual region of the electromagnetic spectrum. Overall, IR obscurants will be employed directly on the threat or between the threat and friendly forces. Visual obscurants are employed on friendly forces to provide

Table 7-1. Sensors and Seekers.



protection while still allowing for the ability to maneuver within the obscurant cloud.

Offense

Employment of an infrared obscurant in offensive operations gives the maneuver commander an additional element of combat power. IR obscurants are able to defeat threat sensors and seekers. Two missions should be considered. One is to utilize the IR obscurant as a screen to prevent thermal ground sensors from detecting and identifying friendly forces. Another is to utilize the IR obscurant to obscure threat sensors. In this mission, given favorable weather conditions, the smoke plainer would employ the IR obscurant directly on the threat sensors.

Defense

IR obscurants in the defense will provide protection from smart weapons and prevent those weapons from acquiring their targets. Although the employment of IR obscurants reduces the friendly ability to maneuver, the commander may choose this option to increase the survivability of his forces in the event that other resources are unavailable to defeat the threat's smart weapons. For example, IR obscurant would provide considerable protection from smart weapons for rear area operations such as port facilities, logistical sites, and airfields.

Cloud Dynamics

Infrared obscurants are subject to the same weather and terrain considerations as visual obscurants. For planning purposes, the IR obscurant cloud will travel approximately the same distances as a visual cloud and will cover the same size target area. Visibility criteria in terms of *haze, blanket,* and *curtain* are not true for IR obscurants. Infrared clouds are defined in terms of transmittance value in relationship to percentage of probability of detection. Given wind speed, source strength, and downwind distance (Annex H), chemical staffs are able to estimate probability of friendly forces being detected when screened or protected by infrared obscurants.

Smoke Control

Generally, smoke control is the function of the smoke platoon leader or the smoke company commander under the direction of the maneuver commander, a breach or river crossing site commander, or a facility commander. Smoke control procedures will be essentially the same for visual and infrared screens. However, at *night,* actual observation of the infrared cloud requires a thermal viewer. Without an IR sensor, smoke control officers will rely on the fog oil cloud to adjust target coverage or on information provided by the supported maneuver unit.

Coordination Measures

Infrared obscurants offer additional options to the commander: visual only, IR only, or visual/IR obscurants. The chemical battle staff must assist the commander in recommending the appropriate type obscurant based on IPB. Limiting factors may be based on planned friendly activity, the need to prevent signaling a friendly presence to the threat force, or danger inherent to friendly operations that might result in increased fratricide.

Smoke Control Graphics

Smoke target numbering systems and graphic control techniques will be increasingly important as commanders and staffs come to rely more heavily upon digitization. Battle staffs will maintain electronic overlays of planned smoke missions (similar to trafficability overlays) to allow for coordination of mission planning with adjacent and higher organizations. With the fielding of large-area infrared smokes, graphic control aids must be developed to portray *no smoke* areas, *visual only* smoke targets, *visual-infrared* smoke targets, and *infrared only* targets. Target numbering procedures should be standardized to enable adjacent units to recognize immediately smoke missions that may adversely affect their operations due to wind shifts, the cloud traveling farther than anticipated, or flank units perhaps being silhouetted. Although subject to local SOPs, visual only smoke target numbers should begin with a V followed by five digits. IR only smoke target numbers should begin with IR followed by four digits. Visual-infrared target numbers should begin with VIR followed by three digits.

Troop Safety

The same masking requirements and procedures for fog oil employment apply for infrared (graphite) obscurants. Overall, carry the mask when participating in operations that include the use of infrared obscurants. Mask when passing through or operating in a dense cloud. If duration of exposure will exceed 4 hours or breathing difficulties occur, masking is required.

LOGISTICAL SUPPORT

Logistical support for chemical smoke units requires special consideration with the addition of infrared smoke material (graphite). One 5-ton truck is capable of carrying the weight (and volume) of 9 barrels of fog oil and up to 4,350 pounds of IR obscurant simultaneously. If two 5-ton trucks are used to resupply 6 generators, the travel time to a supply point, reloading with fog oil and IR obscurants, and returning to the mission site must not exceed 75 minutes. When consecutive infrared missions are desired to support maneuver operations, the chemical staff with the G4/S4 anticipates resupply requirements and ensures that the smoke plan is supportable. Use the consumption table (Table 7-2) as a logistical planning tool for visual infrared smoke operations. Planners should keep in mind the M56 and M58 smoke generator systems have a variable setting capability for both IR (graphite) and fog oil modules. This allows the operator to control the rate graphite and fog oil is consumed. For example, at a consumption rate of 5 pounds per minute, the system can produce 1 hour of IR obscurant. If the consumption rate is 10 pounds per minute, the system can produce 30 minutes of IR obscurant.

CONCLUSION

The M56/M58 smoke generator systems provide commanders and staffs an additional element of combat power. IR obscurants in any operation can be employed to *protect* the force, *screen* friendly maneuvers, or to *obscure* and attack threat sensors and seekers. IPB is critical in planning infrared missions by identifying threat sensors and seekers and how they are arrayed in theater. The chemical battle staff, by participating in the IPB process, war gaming, and rehearsals will facilitate an effective obscurant plan to support the commander's intent. The IPB process, focusing on how the threat arrays his sensors and seekers on the battlefield, are critical steps in planning the employment of IR obscurants.

Table 7-2. Consumption Table.

CONSUMPTION TABLE
M56 / M58 SMOKE GENERATOR SYSTEM

COMPONENT	1 HR	2 HR	6 HR	24 HR	48 HR
GAS TURBINE ENGINE (12 gal/hr)	12	24	72	288	576
VISUAL SMOKE MODULE (1.33 gal/min)*	80	160	479	1915	3830
IR MODULE**	600	1200	3600	14,400	28,800

* FOG OIL CONSUMPTION IS BASED ON MAXIMUM VARIABLE SETTING.

** IR OBSCURANT MODULE IS FED AT A VARIABLE RATE FROM 5 TO 10 lbs/min. CONSUMPTION IS BASED ON MAX SETTING.

M56 CAPACITIES: FOG OIL TANK 120 gal, IR MODULE 300 lbs, GAS TURBINE ENG 26 gal.

M58 CAPACITIES: FOG OIL TANK 120 gal, IR MODULE 300 lbs, GAS TURBINE ENG 95 gal.